Chapter

4

BIGHORN NATIONAL FOREST

Land and Resource Management Plan - Draft

Monitoring and Evaluation

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Chapter 4

Overview

This chapter provides programmatic direction for monitoring and evaluating plan implementation. Monitoring is the process of taking periodic observations to detect changes or trends in resources or environment. Evaluation is defined as interpreting or judging information collected from monitoring.

The purpose of this chapter is to provide the direction to facilitate successful monitoring and evaluation. In brief, the steps to successful monitoring are:

- **Establish Monitoring Priorities:** As part of the annual program budgeting process, priorities are established to conduct monitoring, as it is not possible to address all questions related to management issues or programs. The Monitoring Strategy described at the end of this chapter facilitates establishing these priorities to collect, manage, and evaluate data, and forms the plan of what data is to be collected.
- **Identify Responsible Parties and Potential Cooperators:** Resource program managers on the Forest accept responsibility for ensuring monitoring is completed, and identify ways to gather and evaluate data in conjunction with other agencies or interested parties.
- **Establish and Maintain a Monitoring Guide:** Annually update or validate the Monitoring Guide designed to facilitate data collection and storage on monitoring items identified in the Monitoring Strategy using standardized protocols and corporate data/information storage.
- **Evaluate the Data:** Resource managers will evaluate the data collected with the goal of answering the monitoring questions, and determine if changes are needed in plan direction or outputs.
- **Publish and Distribute the Annual Monitoring Report:** Resource managers will write, acquire approval by the Forest Supervisor, and distribute the annual monitoring report that summarizes information collected and the relevant evaluations.

Monitoring Purpose

Effective Land and Resource Management Plan monitoring and evaluation fosters improved management and more informed planning decisions. It helps identify the need to adjust desired conditions, goals, objectives, standards, and guidelines as conditions change. Monitoring and evaluation helps the Forest Service and the public determine how a Land and Resource Management Plan is being implemented, whether plan implementation is achieving desired outcomes, and whether assumptions made in the planning process are valid.

Monitoring and evaluation are learning tools that form the backbone of adaptive management. With these tools, information is collected and compiled to serve as reference points for the future. Monitoring and evaluation allow the Forest Service to incorporate new understanding and technology; changes in law, policy, and resource conditions; and growing concerns, trends, and changing social values into forest planning. Monitoring and evaluation also allows the Forest Service to evaluate the assumptions used to develop the Land and Resource Management Plan. In short, monitoring and evaluation breathe life into a static document—the plan—to make it dynamic, relevant, and useful. management

- **Implementation** monitoring determines if projects were implemented according to plan direction (standards and guidelines).
- **Effectiveness** monitoring determines if plan strategies and objectives were met.
- **Validation** monitoring verifies assumptions and models used in plan implementation, and determines if implementing the direction and desired conditions in the plan is effective at achieving the goals and objectives.

Monitoring and evaluation are separate, sequential activities to determine how well objectives have been met and how closely management standards and guidelines have been applied. Monitoring generally includes the collection of data and information, either by observing or measuring. Evaluation is the analysis of the data and information collected during monitoring. The evaluation results are used to answer the monitoring questions, determine the need to revise or amend the Land and Resource Management Plan or the way the plan is implemented, and form a basis for adaptively managing the Forest. Monitoring and evaluation keep the Land and Resource Management Plan up-to-date and responsive to changing issues by verifying the effectiveness of the plan's standards and guidelines, by anticipating program and project effects on resources, and by providing information for amendments to the Land and Resource Management Plan.

Information Management

Once the purpose or reasoning for monitoring has been determined (such as to answer a particular monitoring question), the feature or variable that correlates to it must be selected, as well as how it will be measured (protocol). Protocols should adhere to regional or other accepted standardized procedures.

After the Forest Service determines how information will be gathered, data collection begins. Once data are obtained and have been edited to satisfy quality standards, the data need to be stored in a corporate electronic database, such as NRIS or GIS. The data is then analyzed and interpreted.

The interpreted information is evaluated by the resource specialists to answer the monitoring question and give it meaning in the context of the Land and Resource Management Plan. A variety of analytical tools and evaluation procedures are available to interpret data. The results are reported to the Forest Leadership Team to consider and act on. The results are also documented in the annual monitoring and evaluation report. Annual reports should be accessible to the public electronically, with other information available upon request.

Research needs are identified during the development of Land and Resource Management Plans. Any additional research needs are identified during monitoring and evaluation of the plan as it is implemented and in the annual monitoring and evaluation reports. The Regional Forester evaluates any research needs for inclusion in the regional research program proposal that is used by Forest Service Research and Development as input for determining priorities for research funding at the regional and national levels.

There have been several information gaps and **information needs** identified at the time of this plan's preparation. These may contribute to the need for amendments in the future once the information becomes available. The following list is a synopsis of these needs, however it may not be complete.

1. Inventory to determine presence and distribution of occurrences of several of the at-risk species (TES and Local Concern) and their habitat associations, distribution and condition. This is primarily evident for several of the plant species, as described in the Rare Plant Strategy contained in the project record. Also, do lynx occur and does the Forest provide critical habitat? What additional cave resources occur and what is the condition of them? Where are non-native fish having a potential impact on amphibian distributions or occurrence?
2. Both the Terrestrial and Aquatic Ecosystem Assessments {Winters et al 2003; Regan et al 2003} have information needs sections identified in them. For example:
    - What is the appropriate amount of old growth forested habitat to be managing towards, given disturbance processes and current amounts and associated species needs?
    - Noxious weed inventory and expansion potential is not complete.
    - RNA establishment records and associated inventory and monitoring are typically incomplete.
    - RMLANDS software analysis of fragmentation of vegetation community types and associated anthropogenic impacts.

Research Contributions

Research needs are identified during the development of Land and Resource Management Plans. Any additional research needs are identified during monitoring and evaluation of the plan as it is implemented and in the annual monitoring and evaluation reports. The Regional Forester evaluates any research needs for inclusion in the regional research program proposal that is used by Forest Service Research and Development as input for determining priorities for research funding at the regional and national levels.

Evaluation Process

The Forest evaluates the data and information collected through monitoring. Successful adaptive management depends on collectively evaluating the effectiveness of management activities in moving the Forest toward desired conditions. The objective or "desired condition" that prompted the development of the monitoring question is typically associated with one or more monitoring items. Whereas the desired condition may be conceptual or visionary in nature, the monitoring items are generally a measurable aspect of the desired condition.

Evaluation is the process of transforming data into information—a value-added process. It is a process of synthesis that brings together value, judgment and reason with monitoring information to answer the question "So what?" and perhaps, "Why?"

Evaluation requires context: A sense of the history of the place or the circumstances (temporal and special context) are important to the evaluation of management activities.

Evaluation requires base line or reference information: Evaluation will describe movement from a known point (base line or reference condition) either toward or away from a desired condition. The desired condition may or may not ever be fully achieved, but it is important to know if management activities are heading in the right direction.

Evaluation produces information that is used to infer outcomes and trends: Conclusions will be drawn from an interpretation of evidence.

Evaluation results are documented in an annual monitoring and evaluation report: The responsible official (i.e., the Forest Supervisor) uses this report as a tool to initiate change.

Annual Forest Monitoring and Evaluation Report

The annual monitoring and evaluation report is a Performance/Accomplishment Report (PAR) requirement and an output target for Forests and Grasslands. Besides fulfilling these requirements, these reports serve several purposes, including:

- Documenting monitoring and evaluation accomplishments.
- Providing an accountability tool for monitoring and evaluation expenditures.
- Providing an assessment of the current state of the Forest.

- Providing adaptive management feedback to responsible officials of any needed changes to the Land and Resource Management Plan or adjustments to management actions.
- Describing to the public how their public lands are being managed.

The monitoring and evaluation report is based on monitoring data and information gathered the previous fiscal year. It evaluates the Land and Resource Management Plan implementation and provides an overview of resource conditions and trends as they relate to indicators and criteria for sustainability with specific attention on the effects of management on ecological system structure and function. The following items are included in the report:

- **Key findings**, what has changed, what the Forest Supervisor is committing to do about them (signed and dated).
- **Chapter 1.** Setting the Context. An overview of past, present and desired conditions is presented which may be summarized from broad scale assessments, projects, programs, policy and law.
- **Chapter 2.** Monitoring Results. The monitoring results are described, organized by GPRA goals where practicable. These goals are: ecosystem health; multiple benefits to people; scientific and technical assistance; and effective public service.
- **Chapter 3.** Evaluation and Action and Plan. This is a synthesis of results, interpreted to draw conclusions about whether or not we are moving toward the forest or grassland goals and desired conditions.
- **Appendix**

Monitoring items reported on in any given year are determined by the reporting frequency detailed in the chart of monitoring questions in the Land and Resource Management Plan.

Monitoring Guide

The Monitoring Guide provides the specific methodologies, protocols, and administrative information associated with each monitoring item described in the Monitoring Strategy below. The guide is flexible and may be changed as new methodologies and techniques for monitoring are developed and corporately approved. While the guide uses information in the Land and Resource Management Plan, it is not a part of the plan; therefore, it may be changed without necessitating plan amendment. Additional monitoring at the project or site specific scale would continue to occur in response to project questions, but would not be listed in this monitoring guide.

Monitoring Strategy

The Monitoring Strategy provides an outline of the elements to be monitored as required by the Forest Plan. The elements are organized by category of implementation,

effectiveness, and validation monitoring, as described previously. The Plan ID Team developed this list to provide guidance in determining annual monitoring requirements and accomplishments. In almost all cases, it will be necessary for the Forest Leadership Team to prioritize what will be monitored in any given year based on the monitoring drivers, monitoring priorities, the accomplishments of the previous year's monitoring, and the urgency of a monitoring question with regard to available budget. The headings used in the monitoring strategy table are defined below.

Reasons for Monitoring (Monitoring Drivers)

The National Forest Management Act (NFMA) requires national forests to do specific monitoring tasks. The level and intensity of any additional monitoring is dependent on available staffing, funding, and forest priorities.

The following is a list of reasons (monitoring drivers) why certain items are included in a monitoring plan:

- Legal and regulatory requirements.
- Forest Service manual direction.
- Tracking forest desired conditions, goals, and objectives.
- Validation of models/assumptions.
- Tracking agency expectations.
- Tracking public expectations/issues.
- Contributions to broad-scale monitoring.
- Court rulings.

Legal drivers include regulations at 36 CFR 219 that describe NFMA monitoring requirements. Some of these requirements provide guidance for developing the monitoring program while others include specific compliance requirements. The following regulations specify the minimum requirements for monitoring:

- 36 CFR 219.7(f) A program of monitoring and evaluation shall be conducted that includes the consideration of the effects of National Forest Management on land, resources, and communities adjacent to or near the National Forest being planned, and the effects upon National Forest from management activities on nearby lands managed by other federal or government agencies or under the jurisdiction of local governments.
- 36 CFR 219.11(d) Monitoring and evaluation requirements that will provide a basis for a periodic determination and evaluation of effects of management practices.

- 36 CFR 219.12(k) Monitoring requirements identified in the Land and Resource Management Plan shall provide for the following:
    - A quantitative estimate of performance comparing outputs and services with those projected by the plan.
    - Documentation of the measured prescriptions and effects including significant changes in productivity of the land.
    - Documentation of costs associated with carrying out the planned management prescriptions as compared to the costs estimated in the plan.
    - A description of the following monitoring activities:
        - The actions, effects, or resources to be measured and the frequency of measurements.
        - Expected precision and reliability of the monitoring process.
        - The time when evaluations will be reported.
        - A determination of compliance with the following standards:
        - Lands are adequately restocked as specified in the plan.
        - Lands identified as not suited for timber production are examined at least every 10 years to determine if they have become suitable; and that, if determined suited, such lands are returned to timber production.
        - Maximum size limits for harvest areas are evaluated to determine whether such size limits should be continued.
        - Destructive insects and disease organisms to not increase to potentially damaging levels following management activities.
- 36 CFR 219.19(a) (6) Population trends of the management indicator species will be monitored and relationships to habitat changes determined. This monitoring will be done in cooperation with state fish and wildlife agencies, to the extent possible.
- 36 CFR 219.21(g) Forest planning shall evaluate the potential effects of vehicle use off roads and, on the basis of the requirements of 36 CFR 295, classify areas and trails of National Forest System lands as to whether or not off-road vehicle use may be permitted.

Most monitoring drivers are described according to the associated goal, objective, or strategy in the Land and Resource Management Plan.

Monitoring Questions

Specific monitoring questions are developed to ensure that monitoring and evaluation address information essential to measuring Land and Resource Management Plan

accomplishments and effectiveness. These questions help identify issues of concern and reveal how they are changing. The evaluation process (discussed above) determines whether the observed changes are consistent with Land and Resource Management Plan desired future conditions, goals, and objectives and what adjustments may be needed.

Monitoring Priorities

After monitoring questions are developed, a screening process sorts the more significant questions from those of lesser significance to ensure efficient use of limited resources—time, money, and personnel. The priority of a question may affect the intensity or extent of associated monitoring activities. The monitoring strategy includes three classifications to indicate priority. The following is a list of those classifications.

- **High** priority indicates that the monitoring element is required by law or regulation.
- **Medium** priority indicates that the monitoring element is directed by the Land and Resource Management Plan as developed in the objectives and strategies section, but may not be directly associated with required laws or regulation.
- **Low** priority indicates that the monitoring element involves questions of a more indirect nature, or does not fall under one of the above.

Monitoring Items

A monitoring item, or data element, is a quantitative or qualitative parameter that can be measured or estimated. One or more monitoring items are selected to answer a monitoring question. A particular monitoring item may be used to answer more than one monitoring question. Any change to the list of potential monitoring items will be reflected in the Monitoring Guide or Annual Monitoring Report that accompany this Land and Resource Management Plan. Each monitoring item has an associated unit of measure, such as acre, mile, etc. Examples of monitoring items and associated units of measure include acres and location of soils improved or number of degraded water bodies restored on National Forest System land. Details on the units of measure are shown in the Monitoring Guide.

Monitoring Methods

Monitoring methods are developed in the Monitoring Guide and may change based on changes in technology, staffing, budgets, and issues. Only standardized protocols will be used to collect monitoring item data.

Precision/Reliability

The precision and reliability with which each forest program or activity is monitored depends on the particular program or activity to be monitored. There are two recognized classes of precision and reliability:

- **Class A:** The methods are generally well accepted for modeling or measuring the resource or condition. They produce repeatable results and are often statistically valid. Reliability, precision, and accuracy are very good. The cost of conducting these measurements is higher than other methods. These methods are often quantitative.
- **Class B:** These methods are based on project records, communication, on-site ocular estimates, or less formal measurements like paced transects, informal visitor surveys, air photo interpretation, or other similar types of assessments. Reliability, accuracy, and precision are good but less than Class A. Class B methods are often qualitative but still provide valuable information on the status of the resource.

Scale

Scale describes the level of analysis with respect to land size. This measure is important in describing effects dealing with habitat heterogeneity and viability issues, as well as describing cumulative effects of management actions. Examples include 6th-level watersheds or geographic areas.

Frequency of Reporting

Frequency describes the timing of monitoring and evaluation efforts over time. Most data is collected annually, with reporting or evaluation of the data conducted at certain times, such as annually, every 5 years, or every 10 years.

Monitoring Strategy

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Implementation Monitoring – Are projects being implemented according to Forest Plan direction?						
NFMA; Multiple Goals, Objectives, Strategies	Are projects being implemented according to Forest Plan direction? This includes both planned actions and actual implementation.	High	Select at least one NEPA project, and conduct a thorough review of all resource areas to see if Plan strategies, management prescription desired conditions, standards, and guidelines were followed and if the treatment/project was effective to improve land management.	A/B	Varies according to project scale	Annually
Notes: Priority projects include: prescribed fire, timber harvest, travel management and dispersed recreation, and livestock grazing (these are major revision or implementation topics).						
Objective 2a, Strategy 8 Objective 4b, Strategy 4	How well is the Forest interacting and planning in cooperation with communities and local governments?	Medium	Narrative summary of grants and agreements; meetings and coordination efforts with local governments and communities.	B	State; Big Horn, Johnson, Sheridan and Washakie counties.	Annually
Objective 2b	Are Wild and Scenic River candidate waters being managed for the desired conditions?	Medium	Monitor the outstandingly remarkable values from the suitability/eligibility analysis.	B	Forestwide	Every 5 years

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 3a	Is the Bighorn NF assisting in building the capacity of Tribal governments, rural communities and private landowners to adapt to economic, environmental, and social change related to natural resources.	High	1. Summary of financial and technical assistance provided to local communities and natural resource based businesses to pursue self-sufficiency and sustainability.	B	Four-county area	Annually
			2. Summary of Bighorn NF's enhancement of communities' capacities to reduce wildfire risk.	B	Four-county area	Annually
Effectiveness Monitoring – Are desired conditions and outcomes of the Forest Plan being met?						
Objective 1a Strategy 1	Is water quality being maintained according to State standards in all streams of the Forest?	High	Review most recent State 303(d) list for impaired streams on the Forest. Coordinate with WYDEQ to develop a water quality monitoring plan for impacted streams.	A	Forestwide	Annually
Notes: There are currently no impaired stream reaches on the Forest. This item would be activated upon detection of impaired streams or reaches, particularly in municipal watersheds.						
Objective 1a Strategy 2	Were watershed improvement projects completed?	High	Summarize number and type of watershed improvement projects. Identify what percentage of the watershed has been treated.	A/B	Geographic Area	Annually
Notes: Annual improvements conducted in priority watersheds, with goal to complete watershed-wide improvement for three 5th Level HUC watersheds within 15 years.						
Objective 1a Strategy 3	Was the revegetation guidebook completed and implemented?	Low	Report accomplishment date and summarize projects where implemented.	B	Forestwide	Every 5 years

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 1a Strategies 4 through 8	Are aquatic habitat conditions being maintained for native plant, invertebrate and vertebrate riparian-dependent species?	High	1. Summarize results of representative reach habitat monitoring, including riparian vegetation.	A/B	Ecological subsection, Forestwide	Every 5 years
			2. Summarize results of aquatic habitat improvement projects (acres/miles) by watershed.	A/B	Forestwide	Annually
NFMA Species Viability Objective 1b, Strategies 1 - 5	Is the Bighorn NF providing the ecological conditions to sustain viable populations of native and desired non-native species and to achieve objectives for MIS?	High	1b1. Number of Conservation Strategies developed or implemented.	A	Forestwide	Annually
			1b2. Acres of species at risk habitat restored or improved by Forest Service management or permitted activities.	B	Forestwide	Annually
			1b3. Acres of species at risk potential habitat inventoried.	A/B	Forestwide	Annually
			1b3. Acres of species at risk occupied habitat and/or populations discovered.	A/B	Forestwide	Annually
			1b3. Acres of vegetation management projects that occurred in lynx habitat and winter snowshoe hare habitat during the previous fiscal year.	A	Forestwide	Annually

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
NFMA Species Viability Objective 1b, Strategies 1 – 5, cont.			1b4. Number of species monitoring programs established/implemented, including cave resource management and RNA management plans.	A/B	Forestwide	Annually
			1b4. Summarize species- specific monitoring results.	A/B	Forestwide	Specific to monitoring protocol
			1b5. Number of acres of demand species habitat improvement, including big game winter range.	A/B	Forestwide	Annually
NFMA Species Viability Objective 1b, Strategies 2, 4 - 8	Are the population trends of MIS and trends or occurrences of other emphasis species being maintained or improved?	High	1. Avian (MIS, sensitive, local concern) point count transects in representative habitats with results correlated to statewide monitoring.	A	Forestwide	Annually
			2. Results of beaver (MIS) colony reintroduction and aerial survey of number of occupied 6th level HUC watersheds.	A	Forestwide	Every 5 years
			3. Acres of elk (MIS) security areas, and correlation to past amounts available, elk distribution patterns, harvest success, hunt area strategies, herd composition, and population objectives. Updates to road density and vegetation GIS layers to rerun security habitat model.	A/B	Forestwide	Every 5 years

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
NFMA Species Viability Objective 1b, Strategies 2, 4 – 8, cont.			4. Continued habitat use by bats at known occupied caves. Cave roost surveys and other methods.	A/B	Forestwide	Every 5 years
			5. Continued habitat use by goshawks in known nesting territories where active vegetation management has occurred. Verification through nest search with broadcast calls.	A/B	Forestwide	Annually
			6. Continued habitat use by water voles in known locations using live trap or other methods.	A/B	Forestwide	Every 5 years
			7. Continued habitat use by forest carnivores in known locations using snow-track or other methods. Confirmation of lynx sightings.	A/B	Forestwide	Every 2 years
			8. Continued habitat use by amphibians in known locations. Number of reintroductions or expansions of range instream reaches.	A/B	Forestwide	Every 5 years
			9. Fish (rainbow trout and YCT) inventory results to determine occupation and population trends associated to habitat conditions. Report expansions in YCT range by stream reach.	A/B	Forestwide	Every 10 years

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
NFMA Species Viability Objective 1b, Strategies 2, 4 – 8, cont.			10. Continued habitat use by raptor and other rare avian species where known nest locations occur. Nest searches and expanded inventories.	A/B	Forestwide	Every 10 years
Notes: Many items above depend on coordination with WGFD, and reliance on their population/harvest data for big game species. Surveys for Forestwide distribution for several at-risk species (water vole, bats, avian, amphibians, carnivores, raptors) have not been completed and would be the goal in next planning period. Avian point-count baseline trends not available until 2007.						
Objective 1c Strategies 1 - 9	Is the Bighorn NF increasing the amount of vegetative communities restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases and invasive species?	High	The "desired vegetation composition and structure" is defined by the estimated number of acres shown in the EIS effects analysis for the selected alternative.	A	Geographic Area	Every 5 years
			Compare the number of acres estimated to be treated in the EIS with the actual number of acres treated – See note below for treatments estimated for this plan period.			
			Review vegetation treatments to see if they mimic the scale and effect of natural processes.	B	Forestwide	Every 5 years
			Acres/sites of invasive weed infestations compared to previous inventories. Number of acres treated by treatment type and target species. Description of preventive activities. Coordinate as appropriate with the Counties. Evaluate sources or activities contributing to infestations.	B	Forestwide	Every 5 years

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 1c Strategies 1 – 9, cont.			Summarize acres of aspen treated and compare to the number of acres necessary to achieve "regulation". Summarize efforts and results of inventory/monitoring for condition of stands.	B	Forestwide	Every 5 years
			Conduct inventories to determine location and amount of old growth and compare to desired amounts. Update vegetation coverage in GIS.	A/B	Geographic area	Every 10 years
			Summary of control measures for insect/disease outbreaks in high value areas (acres treated).	A/B	Forestwide	Every 3 years
			Summarize insect/disease treatments, and compare to aerial inventory of insect/disease occurrences and extent to determine effectiveness.	A/B	Forestwide	Every 3 years
			Summary of wildland fire interagency relationships maintained, fostered or improved. Summary of firefighter and public safety based on these actions.	B	Forestwide	Every 3 years
			Acres of fuel reduction accomplished in Fire Regimes I and II.	A	Forestwide	Annually

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 1c Strategies 1 – 9, cont.			Number of wildland fire use plans completed. Number of acres treated.	A	Forestwide	Annually
Notes: The following vegetation treatments will be monitored.						
A. Clearcut		F. Precommercial Timber Stand Improvement		J. Wildfire*		
B. Shelterwood – Prep Cut		G. Uneven aged Management, Selection		K. Blowdown*		
C. Shelterwood – Seed Cut		H. Prescribed Fire		L. Commercial Intermediate Harvests		
D. Shelterwood – Overstory Removal		I. Wildland Fire Use*		M. Reforestation		
E. Aspen regeneration		* These are not planned actions but will be tracked over time.				
Objective 1a, Strategies 2	Is usage of dispersed campsites negatively impacting watershed conditions?	Medium	Campsite impacts measured and reported using campsite inventory process.	A/B	Cloud Peak Wilderness 6th level HUC watersheds	Every 5 years
Notes: Campsite condition and numbers can help to determine a trend of potential physical or biological resource damage. Continued growth of unplanned dispersed recreation is a concern.						
Objective 2a, Strategies 2,3	Are developed recreation sites/facilities providing diverse, high quality outdoor recreation opportunities?	Medium	1. Number of master plans written for developed sites.	A/B	Forestwide	Every 5 years
			2. Number of vegetation management plans prepared for developed recreation sites.	A/B	Forestwide	Every 5 years
Objective 2a, Strategies 2, 5, 8 - 10 Objective 2c, Strategies 10 - 12 Objective 4a, Strategy 2	Does the demand for recreation warrant development of additional opportunities (e.g. trails, dispersed areas to recreate)?	Low	Narrative description using customer surveys, public contacts, visitation use records and projections and comparison to available capacity.	A/B	Forestwide	Every 5 years

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2a, Strategy 3	To what extent were vegetation management plans written for developed recreation sites?	Low	Number of vegetation management plans for developed sites and condition of the resource in developed sites.	A/B	Forestwide	Every 5 years
Objective 2a, Strategies 5, 6, 10 Objective 4a, Strategy 1	Is an adequate range of travel opportunities being offered across the Forest.	Medium	1. Individual and organized recreation club contacts, location, trend, and nature of use conflicts, Incident Reports.	B	Forestwide	Every 3 years
			2. Number of travel management plans completed.	A/B	Forestwide	Annually
			3. Scenic byway day use trail completed.	A	Forestwide	Every 5 years
Notes: Studying use and projected demand should assist in future project planning to provide multiple benefits to multiple people.						
Notes: Vegetation within developed facilities (e.g., campgrounds) contributes substantially to the recreation setting. Attaining desired conditions and monitoring results will protect these values over the life of the facility.						
Objective 2b, Strategies 2 – 5	Are human uses of wilderness allowing for preservation of wilderness resources? Is management meeting six of ten BFES meaningful measures? Is the quantity of dead and down woody debris adequate to maintain natural soil characteristics and functions? What level of crowding occurs on trails? Does the Wilderness provide opportunities for solitude?	High	Report soil and vegetation disturbed by human use based on a sample of use areas.	A/B	Wilderness	Five years

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2b, Strategies 2 – 5, cont.			Evaluate tons per acre of dead and down woody material. (Brown - Handbook for Inventorying Downed Woody Material)			Five years
			Report number and type of users by trailhead, law enforcement contacts, and educational presentations.			Annually
			Report the number and type of special exceptions to limited activities			Annually
Notes: Travel management monitoring will provide information for travel plans to be developed. User safety is a concern on some of the busier roads and trails on the forest.						
Objective 2b Strategy 1	Is air and water quality being improved, maintained or degraded in the Cloud Peak Wilderness, and on the Forest as a whole?	High	Coordinate collection and analysis of IMPROVE data (or subsequent protocols) on air quality.	A/B	Established monitoring sites Forestwide	Annually
			Collect and analyze alpine lake water samples for information on air and water quality. Apply quality assurance protocol.		Established monitoring sites Forestwide	Annually
			Review state air quality data for incidences of impairment in relation to Forest activities.		Established monitoring sites Forestwide	Annually
			Prepare summary of annual compliance and identify needed improvements.		Established monitoring sites Forestwide	Annually

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2b, Strategies 2 – 5	Are human uses of wilderness allowing for preservation of wilderness resources? Is the quantity of dead and down woody debris adequate to maintain natural soil characteristics and functions? What level of crowding occurs on trails? Does the Wilderness provide opportunities for solitude?	High	Report soil and vegetation disturbed by human use based on a sample of use areas	A/B	Wilderness	Five Years
			Evaluate tons per acre of dead and down woody material. (Brown - Handbook for Inventorying Downed Woody Material)			Five Years
			Report number and type of users by trailhead, law enforcement contacts, and educational presentations.			Annually
			Report the number and type of special exceptions to limited activities.			Annually

Notes: Monitoring may indicate if a limited permit system or other restrictions are necessary.

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2b, Strategy 6	Have Programmatic Agreements for Heritage Resources been negotiated and implemented for Forest programs?	High	Number and types of agreements in place.	A/B	Forestwide	Two Years
			Identify other program needs and reduce backlog.	A/B	Forestwide	Two Years
			Summarize if terms of agreements are being met.	A/B	Forestwide	Annually
Objective 2b, Strategy 7	Is the Bighorn NF preparing and implementing Historic Preservation Plans?	High	Number of plans completed and implemented.	A/B	Forestwide	Annually
Objective 2b, Strategy 8	What progress has the Forest made for inventorying areas having a high probability for Heritage Resources?	High	Acres inventoried.	A	Forestwide	Annually
			Number of new sites evaluated.	A	Forestwide	Annually
			Number of backlogged unevaluated sites that have been evaluated.	A	Forestwide	Annually
			Number of sites evaluated sent to the State NRHP.	A	Forestwide	Annually
Notes: Related to Section 110 of NHPA						
Objective 2b, Strategy 9	Is the Forest meeting its consultation responsibilities for American Indian Traditional Cultural properties?	High	Number of sites identified.	A/B	Forestwide	Annually
			Number of sites consulted on.	A/B	Forestwide	Annually
Notes: Includes Responsibilities Under Sections 110 and 106 Of The NHPA						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2b, Strategy 10 Objective 2c, Strategy 11	What actions has the Forest taken to increase public awareness and education of Heritage Resources?	Medium	Number of "Pit" projects conducted.	A	Forestwide	Annually
			Number of heritage programs delivered.	A	Forestwide	Annually
			Number of interpretive signs or brochures constructed or maintained.	A	Forestwide	Annually
Objective 2c, Strategies 1, 2	Was forage for livestock provided while meeting or moving toward desired vegetation conditions?	High	1. Total AUMs permitted through term permits each year. Percent change from year 1 and previous years.	A	Forestwide by District	Every 5 years
			2. Total acres of suitable rangeland in active allotments. Percent change from year 1 and previous years.	A/B	Forestwide by District	Every 5 years
			3. Suitable acres in active allotments monitored to determine whether allowable use standards were met. INFRA acres administered to standard.	A/B	Forestwide by District	Annually
			4. Suitable acres in active allotments that met allowable use standards. Acres monitored for permittee compliance.	A/B	Forestwide by District	Annually
			5. Suitable acres meeting, not meeting, and undetermined to be meeting desired conditions.	A/B	Forestwide by District	Every 5 years

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2c, Strategies 1, 2, cont.			6. Suitable riparian acres meeting or moving towards desired conditions, not meeting, and undetermined.	A/B	Forestwide by District	Every 5 years
Objective 2c, Strategy 1	Are existing levels of combined wildlife and livestock herbivory in key areas acceptable?	Medium	Acres of habitat monitored, or # key sites monitored, and results summarized.	B	Project	Annually
Notes: This item relates specifically to areas where moose, elk, and livestock may be over-utilizing riparian, aspen, or winter range resources. Monitoring and management corrections need coordinated closely with WGFD and any affected livestock grazing permittees. Input into WGFD public processes of setting population objectives and harvest levels should occur with regard to carrying capacity.						
Objective 2c Strategy 4	Are the effects of mining activities on surface resources consistent with Forest Plan expectations, as allowed in approved Plans of Operations?	Medium	Summarize monitoring efforts, results, and findings under project-specific Plan of Operations.	A	Forestwide by representative project	Annually
Objective 2c Strategies 5, 8 & 9	Is the Bighorn National Forest providing the desired level of uses, values, products and services of wood products?	High	Forest product outputs, including: Sawtimber (7" +), CCF and MMBF Products other than Logs, CCF and MMBF Roundwood (5-6.9"), CCF (MMBF) Mortality volume, CCF (MMBF) Allowable sale quantity, CCF (MMBF) Christmas Trees Special Forest Products	A	Forestwide	Annually
Notes: The Revised Forest Plan projected the following outputs annually: Sawtimber (7" +), CCF (MMBF): 17,740 CCF Products Other Than Logs, CCF (MMBF), includes roundwood and personal use firewood: 6,100 CCF Roundwood (5-6.9"), CCF (MMBF): 3,600 CCF Personal Use Fuelwood, CCF (MMBF): 2,500 CCF Allowable Sale Quantity, CCF (MMBF): 21,340 CCF Christmas Trees (number sold): 2,100 trees Special Forest Products: 3,000 permits						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2c Strategy 6 & 7	Are resource activities and forest uses consistent with the landscape character goals and scenic integrity objectives? (Landscape character goals to be determined in final EIS and ROD)	Medium	Review a sample of management activities.	A/B	Geographic Areas	Annually
			Map and measure total acres and % of geographic area at each scenic integrity level.			Five Years
			Map areas needing restoration and areas restored.			Five Years
			Compose a narrative and photographic description of the area's landscape character and character changes.			Five Years
Objective 3b, Strategy 1	What is the current condition of inventoried roadless areas?	Low	Acres, miles and/or types of uses and development incompatible with roadless character in inventoried roadless areas. To be finalized to coordinate with RACR guidance at time of ROD.	A/B	Forestwide	Annually
Objective 4a, Strategies 3 - 5	Are all system roads being maintained as desired on the Bighorn National Forest?	High	Percent of roads maintained to standard via force account crew, contract, cooperators, or other means (See MAR, and annual Roads Accomplishment Report).	A	Forestwide	Annually

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 4a Strategy 6	Are unclassified roads and trails being decommissioned?	Medium	Report road decommissioning accomplishments and trail decommissioning accomplishments performed via force account, contract, cooperators, or other means (See MAR and Roads Accomplishment Report).	A	Forestwide	Annually
Objective 4a Strategies 7, 8	Are new construction and maintenance projects being done to reduce maintenance backlogs and are they being done consistent with the current master plan, and meeting the current image guide?	Medium	Report all new facility and transportation construction, reconstruction, decommissioning, and maintenance projects and state how they are reducing maintenance backlogs, or how they are meeting the current FMP or the BEIG.	A	Forestwide	Annually
Objective 4a Strategies 1, 2	What is the current open road and motorized trail density as an indicator of maintenance backlog, recreation opportunity, and wildlife habitat needs?	Medium	Summarize open road and motorized trail density by 5th level HUC watershed, or results in Roads Analysis Process.	A	Forestwide	Every 5 years
			Update GIS coverages when actions implemented.	A	Forestwide	Every 5 years
Objective 4b Strategy 1	To what extent are forest access needs being met?	Medium	Monitor concerns from local counties and forest users.	B	Forestwide	Every 5 years
			Number and status of right-of-way acquisitions	B	Forestwide	Every 5 years

Notes: Providing access to public lands is critical for meeting resource management and multiple-use objectives.

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2c, Strategies 11 Objective 3b, Strategy 3 Objective 4b Strategy 7	Are research, education, and interpretation activities being conducted and in conjunction with partners?	Low	Number of educational presentations, research projects, agreements, or activities conducted with and for others. Identify by resource function.	B	Forestwide	Annually
Validation Monitoring- Are the desired conditions, objectives, and assumptions made in the Forest Plan correct?						
Objective 1a, Strategy 1	Are Best Management Practices effective in meeting water quality standards?	High	Conduct long term best management practice effectiveness studies according to study plans for specific BMPs coordinated across the forest.	A/B	Forestwide by representative project	Annually
Notes: Examples include: stability and effectiveness of stream buffers, road drainage structure operations and maintenance, soil disturbance and downstream aquatic habitat effects in harvested versus non-harvested areas, effectiveness of stream protection to minimize sediment delivery to fish streams. Annual status reports to be completed.						
Objective 1b, Strategy 2	Have management strategies (goals, objectives, standards, guidelines) resulted in an improved status for species at-risk and MIS?	High	Revisit known location, habitat and population trend information data in conjunction with Heritage Databases or other sources. Compare existing status to previous status by species. Validate appropriateness of MIS selected, and the management direction associated with them (e.g. elk security).	A/B	Forestwide	Every 10 years
Notes: Tie known information to regional species assessments as applicable. Amend or edit plan to reflect species at risk or other emphasis species categorizations to ensure correct species are being monitored. Verify if resource outputs are in concert with habitat desired conditions, standards, and guidelines. Alter or amend plan direction as needed. Determine if there were significant changes in elk security habitat, and if these resulted in improved hunting opportunities. Determine if improvements were made in presence/absence or distribution for species for which little information is known.						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 1c, Strategy 4	Are the standards and guidelines effective in meeting regional soil quality standards?	Medium	Conduct surveys on a representative sample of areas with management activities and uses. Measure the amount of severely impacted areas and compare with regional standards.	A	Forestwide by represen-tative project	Annually
Objective 1a, Strategy 4	Are fisheries and riparian standards and guidelines effective in maintaining or improving fish habitat or do they need revised?	High	Survey a representative sample of fish bearing streams in or adjacent to management activities occurring within the last year. The stream segments will be surveyed before activity and again 5 years following.	A	Forestwide by represen-tative project	Annually and every 5 years
Notes: Measure habitat components important for fish, such as large woody debris, pool depth, frequency, percent pool area, stream width-depth ratio, accumulation of fine sediment, and fish passage.						
Objective 1c, Strategy 6	Were the actions taken to minimize insect/disease epidemics effective?	Medium	From summary of treatments, compare to aerial inventory of insect/disease occurrences and the extent of them to determine effectiveness.	A/B	Forestwide	Every 5 years
Objective 3b, Strategies 1 - 3	Is the Bighorn National Forest improving the knowledge base provided through research, inventory, and monitoring to enhance scientific understanding of ecosystems, including human uses, to support decision-making and sustainable management of the Bighorn National Forest?	Medium	Utilize Forestwide inventory and analysis plots (FIA), and FSVeg data from projects, Forest Health Management plots, to validate stand condition standards and guidelines, such as snags, CWD, Old Growth, habitat descriptions, fuel conditions.	A	Forestwide	Every 10 years

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2c, Strategies 1 and 2	Are livestock grazing standards and guidelines effective in meeting or moving toward desired conditions in riparian and upland rangeland vegetation sites?	Medium	From reference stream reaches and upland sites, determine potential and progression towards potential or desired conditions. Methods may include greenline and cross-section protocols for riparian sites and cover frequency for upland sites.	A/B	Forestwide	Every 10 years
Forest Wide Biodiversity Guideline 8 Forest Wide Scenery Guideline 2	What is the relationship between guidelines for downed logs/coarse woody debris and the scenic integrity scale?	Medium	For a range of Bighorn vegetation management sites, determine "tons per acre" and other metrics of woody debris. Describe visual characteristics and other descriptive qualities of the sites. Based on field data identify relationships and determine most useful woody debris descriptors for varied resource values.	A/B	Forestwide	Planning Period
CFR 219.14 Objective 2c, Strategies 8 - 9	Is the Bighorn National Forest inventory of lands suitable for timber production (suited lands) accurate?	High	Utilize the three step process outlined in law and direction to evaluate the suitability of lands for timber production. Review the Bighorn National Forest suitability key to determine it's validity in implementation.	A	Forestwide	Every 10 years